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Example #18

Thermal Curing of the Elastomeric Precursor:
Linear Poly(Silarylene-Siloxane-Acetylene) Where
n=3 (See Example #8 for Synthesis)

To a platinum thermogravimetric analyzer pan was placed 41.6950 mg of the liquid linear poly(silarylene-siloxane-acetylene). The sample was then converted to an elastomer by heating in sequentially under an atmosphere of dry nitrogen for 120 minutes at 200, 250, 300, 350 and 400° C., respectively. After completion of the isothermal curing experiment, the sample was void-free and exhibited the characteristics of an elastomeric material, i.e., soft and flexible.

Example #19

Post Cure Thermo-Oxidative Stability Study on
Crosslinked Poly(Silarylene-Siloxane-Acetylene)
Where n=3 (See Example #8 for Synthesis and
Example #18 for Curing)

Following the isothermal curing cycle performed on the elastomeric precursor linear poly(silarylene-siloxane-acetylene), the sample was allowed to cool to ambient temperature. The elastomeric sample was then isothermed in a thermogravimetric analyzer for 60 minutes at 200 and 250° C. and for 120 minutes at 300 and 330° C., respectively in an air atmosphere at a flow rate of 50 cc/min. The sample exhibited excellent oxidative stability over the time frame of the experiment, experiencing only a 3.96% weight loss. After completion of the thermo-oxidative study, the sample was visibly void-free and still retained flexibility, as determined by bending the sample.

Example #20

Bulk Thermal Curing of the Elastomeric Precursor:
Linear Poly(Silarylene-Siloxane-Acetylene) Where
n=3 (See Example #8 for Synthesis)

To a circular aluminum pan pretreated with a teflon mold release was weighed 1.6053 g of the linear poly(silarylene-

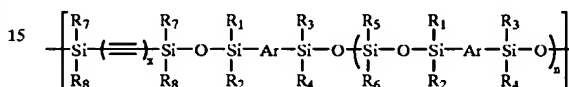
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poly(silarylene-siloxane-acetylene) had been transformed to a tough, void-free, flexible material.

Obviously, many modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

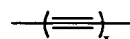
What is claimed is:

1. A crosslinked polymer made by a process comprising the step of thermally curing a linear polymer that comprises repeating units represented by the formula



wherein

- (a) n is an integer greater than or equal to 0,
(b) x is an integer greater than or equal to 1, and



represents an unconjugated acetylenic group when x is equal to 1 or conjugated acetylenic groups when x is greater than 1;

(c) Ar is an aromatic group, and

(c) R¹, R², R³, R⁴, R⁵, R⁶, R⁷ and R⁸ are independently selected from the group consisting of alkyl, aryl, alkylaryl, haloalkyl, haloaryl and mixtures thereof.

2. The crosslinked polymer of claim 1 wherein x is 2.

3. The crosslinked polymer of claim 1 wherein Ar is phenylene.

4. The crosslinked polymer of claim 1 wherein R¹, R², R³, R⁴, R⁵, R⁶, R⁷ and R⁸ are CH₃.

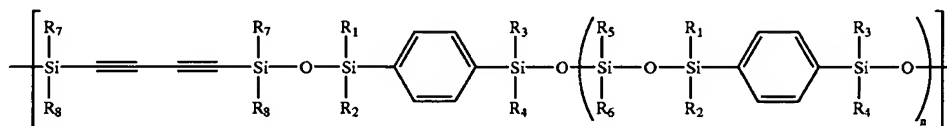
5. The crosslinked polymer of claim 1 wherein n is 0.

6. The crosslinked polymer of claim 1 wherein n is 1.

7. The crosslinked polymer of claim 1 wherein n is 2.

8. The crosslinked polymer of claim 1 wherein n is 3.

9. A crosslinked polymer made by a process comprising the step of thermally curing a linear polymer that comprises repeating units represented by the formula

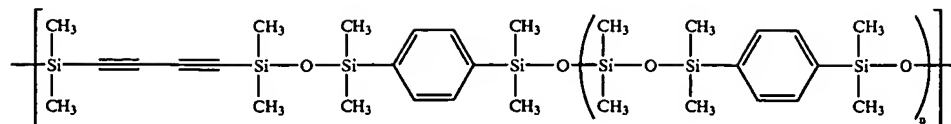


siloxane-acetylene). In order to remove any volatile material, the sample was placed on a hot plate and isothermed at 125° C. under dynamic vacuum conditions. Following the degassing procedure, the sample was placed in a tube furnace and converted to an elastomer by heating sequentially under an atmosphere of dry argon for 120 minutes at 200, 250, 300 and 350° C., respectively. After completion of the isothermal curing cycle, the liquid linear

wherein n is an integer greater than or equal to 0, and R¹, R², R³, R⁴, R⁵, R⁶, R⁷ and R⁸ are independently selected from the group consisting of alkyl, aryl, alkylaryl, haloalkyl, haloaryl and mixtures thereof.

10. A crosslinked polymer made by a process comprising the step of thermally curing a linear polymer that comprises repeating units represented by the formula

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wherein n is an integer greater than or equal to 0.

11. The crosslinked polymer of claim 10 wherein n is 0.

12. The crosslinked polymer of claim 10 wherein n is 1.

13. The crosslinked polymer of claim 10 wherein n is 2.

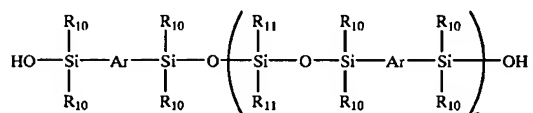
14. The crosslinked polymer of claim 10 wherein n is 3.

15. A crosslinked polymer made by a process comprising the steps of

(a) reacting hexachlorobutadiene with n-butyl lithium to form 1,4-dilithio-1,3-butadiyne,

(b) reacting the 1,4-dilithio-1,3-butadiyne of step (a) with (dimethylamino)(R⁹-disubstituted)chlorosilane, wherein each R⁹ is independently selected from the group consisting of alkyl, aryl, alkylaryl, haloalkyl, haloaryl and mixtures thereof, to form 1,4-bis(dimethylamino, R⁹-disubstituted-silyl)butadiyne,

(c) reacting 1,4-bis(hydroxy-R¹⁰-disubstituted-silyl)-Ar, wherein Ar is an aromatic group, wherein R¹⁰ is selected from the group consisting of alkyl, aryl, alkylaryl, haloalkyl, haloaryl and mixtures thereof, with bis(dimethylamino)R¹¹-disubstituted-silane, wherein R¹¹ is selected from the group consisting of alkyl, aryl, alkylaryl, haloalkyl, haloaryl and mixtures thereof, to form a prepolymer of the formula:



wherein n is an average value greater than or equal to 0, and wherein the value of n is controlled by selecting the initial molar ratio of 1,4-bis(hydroxy-R¹⁰-disubstituted-silyl)benzene and bis(dimethylamino)R¹¹-disubstituted-silane,

(d) reacting the prepolymer of step (c) with the 1,4-bis(dimethylamino, R⁹-disubstituted-silyl)butadiyne of step (b) to form a linear polymer, and

(e) thermally curing the linear polymer of step (d).

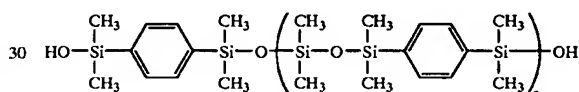
16. The crosslinked polymer of claim 15 wherein Ar is phenylene.

17. A crosslinked polymer made by a process comprising the steps of

(a) reacting hexachlorobutadiene with n-butyl lithium to form 1,4-dilithio-1,3-butadiyne,

(b) reacting the 1,4-dilithio-1,3-butadiyne of step (a) with (dimethylamino)dimethylchlorosilane to form 1,4-bis(dimethylaminodimethylsilyl)butadiyne,

(c) reacting 1,4-bis(hydroxydimethylsilyl)benzene with bis(dimethylamino)dimethylsilane, to form a prepolymer of the formula:



wherein n is an average value greater than or equal to 0, and wherein the value of n is controlled by selecting the initial molar ratio of 1,4-bis(hydroxydimethylsilyl)benzene and bis(dimethylamino)dimethylsilane,

(d) reacting the prepolymer of step (c) with the 1,4-bis(dimethylaminodimethylsilyl)butadiyne of step (b) to form the linear polymer, and

(e) thermally curing the linear polymer.

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